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ABSTRACT

This report describes research that examined ways of reducing the costs of technical and vocational education programs, particularly in developing countries. The report is organized in three sections. The first section offers an extensive survey of recent and current literature, augmented by perspectives obtained from interviews with key individuals with consultancy experience and through consultation with an expert panel at a seminar held as part of the project. The second part of the report identifies a number of key issues, based largely on field investigations by the project team in Thailand, Nigeria, Washington, and Geneva, and literature analysis of project documents. The report concludes with a number of recommendations on intervention strategies that suggest ways in which either the costs of technical and vocational education might be reduced (efficiency strategies), or the benefits from a given level of investment might be enhanced (effectiveness strategies). Efficiency measures that are suggested include the following: (1) staff productivity agreements, incentives, and improvements; (2) improved use of space and facilities; (3) equipment provision linked to spares, staff training, and establishing a maintenance infrastructure; and (4) comparative cost analysis. Effectiveness measures suggested are as follows: (1) analyzing relative impact of investment in general education; (2) introducing labor market signaling by institutions; (3) improving local management development and planning capacity; (4) enhancing institutional autonomy; (5) encouraging interinstitutional competition for resources and students; (6) realigning the planning responsibilities of national training agencies; and (7) undertaking experiments with resource bargaining and incentive systems to encourage a more responsive relationship between training institutions and national agencies. Contains 91 references. (KC)

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EDUCATION RESEARCH

REDUCING THE COST OF TECHNICAL AND VOCATIONAL EDUCATION

A Report
to the Overseas Development Administration

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THE STAFF COLLEGE

Overseas Development Administration

Overseas Development Administration

Occasional Papers on Education

This is one of a number of Occasional Papers issued from time to time by the Education Division of the Overseas Development Administration. Each paper represents a study or piece of commissioned research on some aspect of education and training in developing countries. Most of the studies were undertaken in order to provide the ODA's Education Advisers with informed judgments from which policy decisions could be drawn, but in each case it has become apparent that the material produced would be of interest to a wider audience, particularly but not exclusively those whose work focuses on developing countries.

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INTRODUCTION

1. This Report is prepared for ODA by a research team at The Staff College which has examined ways of reducing the costs of technical and vocational education programmes, particularly in developing countries. The Report is structured so that the first section, initially presented to ODA as an Interim Report, offers an initial, extensive survey of recent and current literature. This has been augmented by perspectives obtained from interviews with key individuals with substantial consultancy experience, and through consultation with an expert panel at a seminar held as part of this project in October 1991. This has enabled the identification of a number of key issues, explored in greater depth in Part B.

2. This part of the Report is based largely on field investigations by the project team in Thailand, Nigeria, Washington (with The World Bank and USAID) and Geneva with ILO/UNDP. It also draws upon further literature analysis, including project documents and field manuals of The World Bank, USAID and the ILO. The field work in Thailand presented opportunities to examine projects funded by the German, Austrian, Italian, Canadian and Japanese Governments, together with World Bank, ILO/UNDP and UNBRO projects. Consultancy visits to Nigeria by two members of the team enabled further evidence to be collected and perceptions checked. The recent substantial two-volume analysis of developments in Latin America by CINTERFOR and ILO was also drawn upon extensively, as was the range of recent publications from The World Bank's Education and Employment Division. Appendix One lists the documentary sources drawn upon for the Report.

3. The Report concludes with a number of recommendations to the ODA on intervention strategies, which from the project findings suggest ways in which either the costs of technical and vocational education might be reduced (efficiency strategies), or the benefits from a given level of investment might be enhanced (effectiveness strategies).

PART A:
THE PUBLISHED EVIDENCE

4. The framework used by the project team to investigate the cost effectiveness and sustainability of technical and vocational education projects was derived from an initial literature survey, which sought to identify some factors leading to project success and failure. A number of these documents are themselves overviews, reviews and synopses of reports on vocational and technical education projects. The first part of this Report, therefore, attempts to summarise key issues raised from the analysis of a very wide range of documents, drawn substantially from the major donor agencies. Inevitably, in a survey on this scale, conflicting findings and opinions were encountered, and attention has been drawn to these where appropriate. The analysis is structured to examine five aspects of project management, which are reported on in turn:

- project preparation;
- project organisation;
- project methods;
- project content;
- project impact;
- project sustainability.

5. Underpinning the analysis is the problem that no single criterion or set of criteria of cost-effectiveness can be identified. The evidence emphasises the complexity of training provision. Although there is general agreement that the effectiveness of such training should be measured in terms of impact on the labour market, there is no such accord as to the measurement instruments which should be used. The complexity, variety and dynamism of both training provision and labour markets, and the importance of contextual social, cultural and political factors, make comparisons particularly difficult (King, 1988). Crude effectiveness measures such as the numbers of trainees obtaining employment and wage increases after training give few insights into the 'value-added' effects of the training itself - even where this basic information is available. Nor is there any consensus as to modes of training which are more or less efficient than others. While the importance of appropriate materials and equipment for technical and vocational training is of course generally acknowledged, access to, uses of and organisation for the practical elements of such training are all matters of dispute. Furthermore, despite the numbers of documents scanned, few detailed references were discovered to this important aspect of vocational and technical education in the initial literature survey. In consequence, these issues are examined through the field investigations reported on in Part B.

PROJECT PREPARATION

6. Policy papers and evaluation reports (Rosenthal *et al*, 1986; Hultin, 1987, Higginbottom, 1990) point to the significance of a number of pre-conditions necessary (but not sufficient) for the success of technical and vocational education programmes. These include macro-economic, social and political factors shaping the national or regional context in which a project is planned, together with the detailed technical, organisational and resource issues related to the project itself. This section examines four such pre-conditions:

- a sound basis in general education;
- firm links between training organisations and the labour market;
- needs analyses which involve customers as well as providers; and
- appropriate selection of trainees, staff and locations.

7. The significance of the educational base upon which technical or vocational programmes are built cannot be under-estimated. It determines the educational entry levels of those to whom the programme is directed, as shaped by the regional or national patterns of educational provision (Middleton & Demsky, 1989). This sound educational base is commonly identified as a necessary pre-condition for successful vocational training projects (Rosenthal *et al*, 1986), and is further defined as universal primary education with at least 50% take-up of secondary education (Hultin, 1987). The World Bank has recently emphasised strongly the importance of a strong basis of literacy, numeracy and problem-solving skills as a foundation for effective technical and vocational education (World Bank, 1991). It points to the importance of a sound - and completed - primary and secondary education, which focuses upon basic skills and knowledge developed at the primary level and the broad competencies developed through an academic secondary education.

8. However, there is no consensus when attempting to define the nature and structure of such provision. In particular, although the benefits of including both academic and vocational elements within a diversified secondary curriculum are emphasised by Hultin and others, The World Bank (1991) considers that diversified curricula and pre-vocational programmes at primary and secondary level dilute and reduce the effectiveness of this educational base. Production work in schools is seen as a means to improved teaching in Hultin's (1987) review for SIDA, but other evidence suggests that skills gained within a general education

are lost if not practised immediately. Diversified schools are criticised particularly when found alongside specialised skill training centres, supported by private enterprise or by technical government ministries (e.g. labour, agriculture, industry), although Hultin pointed to the efficiencies obtained by parallel provision by Education and Labour Ministries. Some studies have found that educational performance in technical/vocational schools has exceeded that in general academic schools (Lockheed & Hanushek, 1987). There is more general agreement that the pre-vocational curriculum should include 'transition' elements which relate the general curriculum more closely to the world of work, and provide experience of working life, rather than trying to provide the specialist training found in the skill training centres (Coombe, 1988; World Bank, 1988 & 1991). A first question is, therefore, whether a programme investment of a given size might more usefully be devoted to the improvement of primary or general secondary education rather than to technical/vocational education. A second question is whether it is more cost-effective to invest in the development of technical and vocational elements within mainstream educational curricula rather than invest in the development of a discrete technical/vocational training sector with its separate institutions. These issues are returned to in Part B (paragraphs 33-35).

9. A second pre-condition concerns the economic environment within which technical and vocational education takes place. Where labour markets and unemployment levels are such as to make it difficult for the 'graduates' of technical/vocational education programmes to find work, it is unrealistic to expect that the skills developed will enable those graduates to achieve self-employment. Self-employment tends to be either low-skilled, or requiring the broader competencies acquired through general education. Governmental attempts to regulate or even predict their economy's manpower requirements have been largely unsuccessful (Carron, 1984; Psacharopoulos & Woodhall, 1985; Demsky, 1989). The notion that training should be geared to manpower requirement forecasts is now largely discredited (Hollister, 1983; Dougherty, 1989). Links between technical/vocational education programmes and the employers - especially private sector employers - likely to take advantage of the programme outputs are commonly weak, and it has been demonstrated that labour markets adjust to imbalances through capital-labour and task substitution rather than through training policies (Richter, 1986). Some sectors, particularly in agriculture and other rural industries, do not have an infra-structure to support training, while the weaknesses of private sector training (often reinforced by unnecessarily tight regulation) have meant that technical/vocational programmes have been concentrated in public sector institutions, whose growth is related more to short term political advantages rather than clearly identified economic or social needs. A further pre-condition for cost-effective vocational and technical education is, therefore, the existence of working links between training institutions (public and private sector) and sources of consequent employment. World Bank studies (Middleton & Demsky, 1989) have contrasted the achievements of middle-income developing countries, which have developed appropriate infra-structures, with the failures of low-income countries to set up appropriate vocational training. King (1988) however, points to the dangers of technological determination, which restricts the role of technical and vocational training in the industrially weaker developing countries.

10. Evidence points to some specific needs in designing and planning technical/vocational programmes. One is for the selection of programme objectives from an initial analysis of possible objectives. These need to be undertaken in such a way that the providing organisations and the potential beneficiaries appreciate both the selected objectives and those possible objectives excluded in this instance. In selecting objectives, initial needs analyses are required, involving simple data collection procedures which reach out to both the consumers (potential graduates etc.) and customers/clients (potential employers) as well as the government officials and institutional heads most likely to be involved. These have been criticised where they focus upon individual rather than organisational needs, (Akin-Ogundeji, 1987). This needs to be followed by an equally careful examination of the range of alternative ways by which agreed objectives might be achieved. This could well require some experimentation through pilot programmes, and Sahara (1991) has criticised aid agencies for omitting this crucial step. A third pre-condition is, therefore, the need for significant investigation and analysis of purpose and need, extending beyond the traditional governmental, political and institutional contacts to communities, employers and consumers.

11. A further pre-condition concerns the selection of those to be involved in the project. Timescales, as well as objectives, need to be realistic. The involvement of local staff in project design can identify potential blockages and the impact of local and national cultural influences on project timescales and objectives. The selection of external consultant support needs to give weight not only to expertise but also to commitment over a period of time. Investment in the selection, preparatory briefing and thorough induction of external consultants helps to alleviate 'culture shock' problems and build commitment. A particular problem has been the failure of training needs analyses

to take note of the training needs of women, notably in agriculture and commercial areas (Dougherty, 1989; Demsky, 1989). The initial selection and involvement of counterpart staff with sufficient status to effect project change when necessary is also important. A further organisational need is the careful selection, not only of personnel but also of appropriate training sites (Lackey, 1981). Assumptions of achievement through existing public sector institutions, whether at home or overseas, need to be challenged. Investment in project staff selection, induction and development - including team-building - helps to reduce wastage later in the programme.

12. Higginbottom (1990a) points to the need for clear definition of objectives and recognition of social as well as economic issues. A more fundamental criticism of project preparation procedures comes from Sahara's (1991) comparison of donor cooperation and delivery styles. The limitations of approaches with tight project specifications according to donor-initiated blueprints are contrasted with the 'hands-off' approaches of agencies (such as SIDA), and the 'collaboration' approaches (typified by the Japan International Co-operation Agency) by which recipients request help and donors then examine their capacity to respond. Project preparation in the latter two styles is marked by the involvement of both donor and recipient in the target-setting processes. Sahara points to the value of small-scale initial interventions, learning about recipients' perceptions of problems, collecting information through in-depth surveys, and conducting small-scale investigation projects, in order to identify the most potentially successful areas of cooperation.

PROJECT ORGANISATION

13. The involvement of local industry is generally seen as a central requirement for cost-effective technical/vocational education. Traditional apprenticeship systems have long been highly cost-effective means for transmitting skills (ILO, 1972; Fluitman, 1989). Programmes can take advantage of these, where they still exist, but must take care not to distort and thus destroy what is a low cost but fragile form of technical/vocational training (Bas, 1988). The more effective utilisation of existing employer training schemes can be stimulated by involving these in development projects, supporting them through technical assistance and some subsidy, and by encouraging the removal of artificial barriers designed to protect public sector training institutions. Cost reductions can be achieved when making use of skilled staff, materials and equipment as well as possible financial support from local industry. This usually requires effort to ensure that such industry recognises the consequential benefits of better skilled existing and future workers. This needs close and well-structured links between employers and institutions. Local advisory committees are identified as highly effective means for building these bridges. Technical/vocational education needs to have close links with local industries and employers and make full use of the cost economies possible in working with them, for example in using their equipment and staff.

14. The supply of equipment should complement rather than duplicate experiences which can be acquired through work-based learning. Obvious but important needs include an emphasis on simple, robust equipment for which spare parts and consumable materials can readily be obtained locally and, just as important, funding regimes which enable the regular purchase of these. There are a number of references to the wastefulness of large, elaborate and complex equipment where maintenance and repair demands resources beyond those of the recipient organisation (Cracknell et al, 1981). However, there is also criticism of policies which provide out-of-date equipment, which might be simple and robust but for which spare parts are no longer available. Centralised workshops have been identified as convenient means for maintaining effective supply lines, and a resource of competent maintenance staff (Austin, Mackintosh & Scott, 1987). But they have also been described as wasteful, inaccessible from training institutions, and governed by impenetrable bureaucracies. Further problems occur when equipment is received at a training centre which has neither the requisite installation nor maintenance skills. A maintenance culture (examined in more detail in paragraphs 74-76) may require its own training objectives, but these will promote project sustainability. Such a culture might incorporate systems for recycling materials, mobile service teams to repair broken equipment, and the encouragement of local entrepreneurs to fashion tools and spare parts. The establishment of a national or regional equipment manufacturing centre takes the process of centralised provision one stage further.

15. Evidence of premises provision points to the adequacy or otherwise of physical design, rather than providing specific cost reduction pointers. Adequacy measures include storage space, noise reduction, air pollution control, energy consumption and weather protection. Reports point to more and less effective forms of provision, without specifying the characteristics of either - except to point to situations where the technical advice of the donor agency has or has not been followed. The main cost reduction lessons come from the more intensive use of facilities by using the extended day, the extended year and double-shifts. The use of self-help methods in constructing workshops with community support, and the development of simple, cheap and locally designed facilities is noted.

16. Much criticism points to the inflexibility and rigidity of many externally-funded projects. The ability to change plans and vire funds as local needs or national economic or political requirements change is important, but this requires built-in monitoring systems to spot these changes, and also to identify unanticipated project consequences including social and environmental changes. The need has also been identified for flexible and responsive training systems, which can change as needs change; and in turn decentralised decision-making and close links with local industries seem necessary to ensure such responsiveness (World Bank, 1988; Dougherty, 1989).

17. This flexibility needs to extend to timescales and funding regimes. Resources are wasted when they are consumed hastily because of the impending end of a financial year, whether that of the donor or recipient organisation. Flexibility extends still further to include the use of staff. External consultant support can be very expensive, and, in order to be cost-effective, needs to be able to adapt to the changing needs of a programme and its environment. This points to, as indicated above, the long-term commitment to a programme and the need for multi-skilled consultant support which, once on site, can provide the support which is most appropriate at the time rather than that which was anticipated when the consultancy was first mooted. The training of local trainers can be a key element in reducing costs, particularly where they are then able to cascade skills. There are dangers, however, in becoming over-dependent both on external consultants and on their counterparts, as the project can then rely too heavily on key individuals (Higginbottom, 1990b).

18. The establishment and maintenance of effective planning, control and monitoring systems is an obvious but crucial aspect of project organisation. Lessons include the need to ensure the timescales of equipment and training provision coincide, that effective financial management systems are established, and that communication networks and information flows are not obstructed. The importance of consistent, well-organised donor supervision and monitoring is emphasised (Demsky, 1989; Harris, 1990). Performance monitoring and performance auditing are now being used to review the supply of equipment and materials and to test investment in these against programme objectives.

PROJECT METHODS

19. As already emphasised, the evidence points firmly towards closer integration of training and industry, rather than heavy investment in facilities which duplicate or simulate industrial experience. This requires a central focus on 'learning by doing'. This in turn requires careful organisation and effective supervision. The availability of placements for work-based learning and experience requires significant investment in the selection and development of industrial liaison/work placement specialists, whose tasks include explaining to local managers and supervisors the range of experiences sought through work placement and the benefits to the placement providers. Effectiveness is also enhanced by bringing in industrial managers to contribute to institution-based education and training. Barriers to the use of such staff in public sector institutions need to be overcome. This can require examination of timetabling systems as well as employment and payment systems.

20. Cultural issues need to be addressed, so that the off-job training experiences reinforce traditional hierarchical organisational structures and their managers, rather than attempting to challenge and criticise these. The emphasis needs to be on a partnership of training institutions and work places rather than on competing value systems.

21. In more detail, learning-by-doing strategies can most effectively be achieved by project approaches using small groups and team-work. Akin-Ogundeji (1987) has contrasted Western concerns with appropriate methodologies and their development with African training programmes focusing solely upon individual effectiveness. These need to be supported by appropriate educational technologies. In spite of supply and maintenance difficulties, the use of video and computer technology can substitute for the lack of skilled instructors, and/or replace some trainer costs to reduce the overall cost of training. It is important that these educational technologies are in tune with local consumer and work technologies, to facilitate maintenance and the provision of spare parts.

PROJECT CONTENT

22. Curriculum frameworks which are based on the development of defined competencies, and are structured in modular formats, reduce the costs of technical and vocational education by:

- reducing the opportunity costs to trainees by providing short, intensive training modules which minimise absence from work;
- reducing the volume of training received, by enabling trainees to undertake only those modules for which they have a defined training need;
- structuring the modular provision to maximise class sizes, relating the frequency of provision to demand; and

- encompassing forms of open learning and individualised instruction which can complement, and for some students replace, forms of traditional learning. Such approaches also relate more clearly to the outcomes than traditional technical/vocational courses, in terms of new competencies and their relevance to employment, thereby increasing effectiveness by increasing motivation.

23. The high cost of teachers in a labour intensive industry points to the need for cost reduction strategies by increasing teacher productivity. This is being achieved by requiring teachers to teach for longer hours per week, to teach larger classes, and, by operating double shifts, to make more effective utilisation of expensive premises. The rigidities of public institutions in these areas has encouraged a shift to private institutions, in order to reduce costs (Coombe, 1988). However, there is little evidence as yet of the impact of such changes on the quality of education (King, 1988).

24. The effectiveness of out-of-country training and education is questioned, not so much because of the irrelevance of such training, but because of the consequent success of graduates in moving either into more senior posts where the technical and vocational skills acquired through their training are no longer needed, or into a sector where their technical skills are lost to the project. The cost advantages of sending trainers to the host country rather than trainees overseas are spelled out by Baker et al (1984). The demand for out-of-country qualifications, particularly at Masters level, remains high. Legitimate expectations here can be met by making use of the more flexible routes to such qualifications, which incorporate in-country training, either on a franchise basis or through satellite campuses; and through development of individualised programmes and fellowships which lead to a portfolio against which the qualification is assessed. Such fellowships can benefit from short, sharply focused periods of attachment to carefully selected out-of-country industries as well as training institutions. More attention needs to be given to 'cascade' strategies and 'multiplier' or 'ripple' effects, whereby short overseas training experiences focus on helping the trainee to lead training activities on return. The need for a careful evaluation of the impact of overseas-based training compared with local provision is a high priority (Moock, 1984).

25. There is growing international recognition that output measures are more effective indicators of the performance of technical/vocational education than input measures. The importance of job placement at the end of a training programme is being demonstrated by new funding mechanisms which reward training institutions on the basis of the proportion of successful job placements. Although this is an obvious (though crude) efficiency measure, training institutions commonly have little commitment to job placement and even less responsibility for trainees in their professional development after the training period is over. Investment in career guidance and job placement will not reduce the costs of technical/vocational education. It is likely, however, to increase the efficiency of such education and training, particularly when one efficiency measure is the unit training cost per successful job placement.

PROJECT IMPACT

26. An image of project success is important in providing its graduates with the confidence to make full use of their learning. This requires immediate evidence of beneficial results and changes. These are most immediately obvious in the employment success of graduates, and are used for investment in job placement as an integral part of a project. This in turn argues for the need to explain to local employers and their managers the skills which graduates will be able to bring - and the cost savings that those skills are likely to lead to.

27. Tracer studies and other short-term forms of manpower analysis are more useful measures of project success than rate of return calculations or measures of the extent to which manpower forecasts are fulfilled. As indicated earlier, there is general dissatisfaction with traditional approaches to manpower forecasting (Psacharopoulos & Woodhall, 1985; Demsky, 1989); and the need for developing more sophisticated techniques for manpower analysis is strongly emphasised.

28. The establishment of industry/education links, as with an Industrial Liaison Unit, has benefits beyond those of the initial intentions (Skelton and Faulkner, 1990). More generally the importance of incorporating formal mechanisms for beneficiary assessment is now being emphasised (Salmen, 1990, discussed below in paragraph 57). This is particularly important in view of the unanticipated benefits and costs not picked up through project objectives (Higginbottom, 1990).

PROJECT SUSTAINABILITY

29. In the longer term, the effectiveness of technical/vocational education projects depends in part upon the retention in employment of the trained staff, and their ability to contribute to their employers' success; and in part on the capacity of the workshops and training centres to maintain equipment with spares and consumable items well after the completion of the project, and the development of the technical support to maintain and repair equipment. These

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internal and external measures of sustainability come together with the growing inter-connectivity of teaching institutions and employers, so that responsibility for continuing the financial, material and expertise support initially derived through the project, is provided in the longer term by the local employers. This argues for the reduction of barriers between private and public sector institutions, and for the development of 'sustainability indicators' (World Bank, 1989).

30. The economic measures of sustainability need to be complemented by a 'social audit'. This would identify the consequences of project intervention in areas not readily definable in financial terms. The impact of potential cost reduction measures needs then to be judged not only economically but in terms of social consequences. The 'fit' between project outputs and the host area's needs is a key sustainability measure (Higginbottom, 1990). Project success measures need to include consideration of its capacity to adjust to changing local needs.

31. The issues examined in this initial analysis are cast at a high level of generality. There is little reference to detailed administrative and organisational issues - the building blocks of cost reduction within a project. This is a reflection of the literature initially examined. Reference to budgetary reductions are almost always in the context of governmental (donor or beneficiary) financial constraints and changes in local or global economies. Very little evidence is published concerning specific cost reduction measures, and even less evidence relates to the provision of equipment, materials and premises, which impact upon project effectiveness. Part B focuses upon these aspects of technical/vocational education projects, upon field analysis of the issues specified in the list below.

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PART B: DONOR AGENCIES AND THEIR CUSTOMERS

32. The second part of this Report examines in more detail a selected number of issues identified as significant in the initial analysis. They comprise:

i. aspects of general primary and secondary education identified as underpinning effective technical/vocational education;

ii. uses of innovative curriculum strategies, including modular curricula and competence-focused training;

iii. experiences of substitute training technologies, including radio, video, open learning and computers;

iv. ways in which pilot programmes and low-cost experiments might improve processes of needs analyses and target-setting;

v. evidence of needs analyses which examine community, employer and trainee perceptions (including women as potential trainees);

vi. donor agency strategies for assessing needs of training systems, agreeing intervention strategies and achieving more flexible supervision and monitoring;

vii. techniques for assessing the capacity of existing training institutions;

viii. costs and benefits of more intensive uses of facilities and equipment;

ix. strengths and weaknesses of centralised workshops;

x. strategies for recurrent support of workshops and training centres, including equipment supply and the development and support of installation and maintenance infrastructures;

xi. ways of linking with and building upon existing informal/non-formal training and apprenticeship systems; and

xii. experiences of making use of local industry - staff and equipment - for technical/vocational training, and of linking formal and informal industrial sectors.

Each is examined in turn.

UNDERPINNING ASPECTS OF PRIMARY AND SECONDARY EDUCATION

33. A major theme in recent World Bank analyses of successful technical and vocational education projects has been the vital importance of a sound basis of general education. However, it has proved difficult to identify specific aspects of the content of primary or general (academic) secondary education, which provide a necessary base for later vocational or technical learning. The educational reforms of the late 1970s are cited in Thailand as having introduced a more practical primary curriculum, with a stronger focus upon pupil activity, and this is believed to have prepared students better for later vocational studies, as well as achieving 95% primary education completion rates. The acquisition of sound learning habits, good manners, and obedience, together with the basic literacy and numeracy achieved by completing primary education, and the ability to follow sequenced instruction seem likely to be more important than any specific learning content at primary and lower secondary levels (Thailand Development Research Institute, 1991). The experience of the Technical and Vocational Education Initiative (TVEI) in England and Wales does not seem to have pointed to specific pre-vocational learning experiences which enable students to learn more effectively on later vocational programmes, while the inclusion of Technology in the core primary curriculum is too recent a development to evaluate its impact on later learning. However, UNDP/ILO have suggested that skills for "horizontal thinking" benefit workers when improvising solutions to technical problems. These are skills more readily acquired through general education than through specific skills-based technical education. Lau et al (1990) draw attention to the ways in which general education can enhance communication and coordination skills, and facilitate adjustment to change, enabling workers to adapt more readily to new technologies and working practices.

34. The greatest benefit of a sound general educational base before entering a vocational course seems to be the opportunity to focus on technical and vocational learning rather than to spend a major part of the course on remedial general education - a characteristic feature of vocational learning where students have an inadequate general grounding when entering the vocational programme. Successful vocational training requires a basic level of competence in numeracy and literacy, and in scientific and problem-solving skills. Evidence from Nigeria revealed expensive resources being tied up in pre-vocational courses in order to provide students with the basic entry qualifications for a technical/vocational course. Apart from raising questions about the appropriateness of the specified entry standards, this also pointed out the additional

costs of using higher paid 'polytechnic' staff in undertaking work which could have been achieved at lower cost by primary and secondary school teachers.

35. The basic literacy and numeracy skills are of greater value than specific technical skills when students are unable to find work immediately after they finish training. Technical skills tend to deteriorate with disuse, and employers prefer literate and numerate recruits who can follow instructions and acquire new short-term skills quickly as new job opportunities occur. This is reinforced when employees perceive that recruits with basic primary and lower secondary education will accept lower wage levels than those who have completed post-school technical education. Middleton, Ziderman & Adams (1992) also point out that employers believe that general education identifies individuals who are inherently more productive. They review the substantial body of research which suggests that investment in vocational and technical education (which tends to be significantly more expensive per capita than investment in general education) pays dividends only where post-training employment opportunities are available and expanding - and where the skills learned match employer needs. In Thailand, economic expansion over the past decade has meant that the job opportunities and wage levels for qualified vocational/technical students tend to reflect their training; supporting evidence that where economies have developed to this level, investment in vocational education can be more cost-effective than in general secondary education. However, in countries without these favourable conditions, where trainee output significantly exceeds job opportunities, investment in general education in order to raise levels of basic literacy and numeracy would yield larger dividends than investment in the technical/vocational sector. This investment might be achieved by the conversion of technical institutions into schools with a lower cost general curriculum, as was achieved with the South Korean agricultural high schools. There is, however, a proviso. Primary and secondary school curricula must focus upon the basic skills of numeracy, literacy and scientific understanding. They must not be overloaded with additional functions - including diversified pre-vocational syllabuses.

INNOVATIVE CURRICULUM STRATEGIES

36. A growing world-wide interest in greater educational productivity has shifted the focus away from curriculum development 'per se' towards the more effective delivery of existing curricula, through both quantitative and qualitative improvements. The former can be achieved through the more effective use of teacher and student time. The 'time-on-task' studies (including recent analyses of English primary education) have pertinent lessons for vocational learning. They point to the need to maximise the time spent by students on active learning, through positive instruction involving well-sequenced tasks and regular assessment to identify when specified skills have been acquired. Conversely, strategies are needed to reduce time-wasting in the classroom or workshop, whether through excessive administrative activity, classroom disorder, unnecessarily repetitive activities or 'busy-work,' designed to keep students occupied rather than actively learning.

37. Qualitative strategies for more effective learning focus on the central role of the instructor. Well-structured, well-presented and well-paced teaching leads to effective learning, particularly where reinforcement techniques are used to boost skill acquisition and students are allowed to progress through instructional materials at a pace appropriate to their ability. All this points to the crucial importance of adequately-trained teachers, who understand both the practical and academic aspects of their subject area. Few developing countries can afford the luxury of a cadre of workshop technicians. Teachers and instructors need to be able to handle both practical and theory teaching, and the practical work is likely to include the capacity to service and repair relevant equipment. Pedagogical skills are also important, with staff able to manage a wide range of classroom and workshop instructional modes. These staff can effectively be complemented by the use of part-time instructors from industry. Mexico and Uruguay demonstrate the impact of this common British strategy in Latin America, with benefits not only of greater relevance but also of increased flexibility of timetabling and course scheduling.

38. The organisation of teaching and learning into modules offers opportunities for more flexible, more cost-effective and more individualised learning. Such approaches are common-place in most developed countries, based on the recognition that technical and vocational learning comprises core or generic skills, which are supplemented by more specific skills derived from occupational analysis of the areas of employment for which the training is designed. Modular training systems were developed in Latin America (initially with INA in Costa Rica), and, with the help of ILO and CINTERFOR, have since been transferred to many developing countries outside the continent (CINTERFOR, 1991). The central principle is the design of 'pedagogical modules', to be taken in succession, with or without breaks in between, through which the knowledge and skills required to undertake specified tasks are acquired progressively.

39. One significant cost-reduction approach in curriculum organisation derives from the clarification of generic skills and their clearer distinction from specific job-related skills. In the UK the Employment

Department supported the analysis of generic or core skills for vocational education (Levy, 1987), and this framework has been used to distinguish between off-job and work-based learning strategies in both selecting and training craft operatives in a major recently privatised British company (Grundy, 1991). A process of 'core analysis' was used to assess skills needed for competent work performance, and thereby identify both core and job-specific skill enhancement needs. In Latin America the "analytical, active and dynamic method" based on occupational analysis has been developed by SENAI in Brazil. Teaching units with instructions and exercises on 'instruction cards' are prepared for occupation-specific workshops or technical training, and the units organised into a 'methodological sequence' required for learning a specified occupation (CINTERFOR, 1991).

40. Work-based learning and 'teaching unit' approaches require specific instructional skills which differ from traditional classroom and workshop based teaching skills. Both focus upon the provision of individualised instruction, with the former making use of 'individual development plans' (Hunt, 1991). This draws attention to the strategies needed to diversify the instructional portfolios of teachers, lecturers and instructors. While teaching styles are to some degree culturally determined, Bowen and Douglas (1971) long ago drew attention to the costs and benefits of different instructional strategies. Later research has pointed consistently to the benefits gained when teachers expand their instructional portfolios, so that they are able to tailor instruction to the needs, abilities and size of student groups. Themes particularly relevant to vocational education concern the ability of the teacher to focus instruction on concepts of 'competency' or 'mastery'. Central to these is the organisation of learning with clearly specified objectives and assessment procedures, so that teachers can spot when the required standard has been achieved and direct the student to the next learning tasks and objectives. The very substantial development work undertaken across the British further education sector in identifying competences, modularising learning materials and developing assessment procedures can, with appropriate adaptation, be translated into cost-effective training in developing countries - but only where the teachers are themselves competent in both instruction and assessment, and are able to manage classrooms and workshops where students are learning at different rates.

SUBSTITUTE TRAINING TECHNOLOGIES

41. While there is plenty of evidence of substitute training technologies which have proved unsuccessful, the evidence of successful innovations is less obvious. Simple technologies, and in particular the provision of adequate print-based materials, do seem to be able to compensate to some extent for poorly trained teachers (and conversely better trained teachers can overcome text-book deficiencies). An immediate and important advantage of such materials is that teaching and learning become more productive when lecturers do not have to use their teaching time dictating or writing on the blackboard notes for their students to copy down. Low-cost, centrally produced print materials, including materials translated from foreign publications into Thai, are the mainstay of much of Thailand's vocational teaching, although there are fewer signs of these being supported by other centrally produced training technologies - transparencies, simple models and other visual aids. However, colleges have used considerable ingenuity in developing their own materials (especially transparencies), although video production, while ubiquitous, seems more a public relations than a teaching aid.

42. The work of regional centres in Latin America such as SENAI and SENAC in Brazil are cited as examples of successful central production and distribution of instructional materials (CINTERFOR, 1991). The preparation and use of 'didactic packages' and 'instruction sheets' referred to above are central to the distinctive training methodologies employed by SENAI in Brazil, adopted by the other Latin American regional centres, and coordinated and disseminated across the centres by CINTERFOR in the form of 'basic collections' of information sheets, carefully sequenced to be used as self-teaching materials. These have been backed by multi-media materials including video- and audio-tapes, slides, etc. by centres such as SENA in Colombia. These developments are now being taken further, for example at INA (Costa Rica) and INFOTEP (Dominican Republic) with the introduction of modularised learning based on sets of highly structured yet flexible individualised training materials using active learning principles. They have the advantages of entry and exit at the trainee's pace rather than on specified academic years, and of more intensive use of workshops and 'workposts'. Evaluation by CINTERFOR has suggested productivity benefits with fewer instruction hours per student, as long as monitoring and facilities provision is carefully managed. One SENAI training centre is described as having reduced the time required to complete training by 45 - 75%. It provides 'roll-on, roll-off' year-round individualised instruction in modules, with the point of entry determined by initial assessment.

43. Herschbach (1989) draws attention to the potential benefits of educational technology in developing countries, in substituting for the face to face presence of qualified and experienced teachers, and in disseminating instruction to small groups and individuals who do not have access to conventional facilities. Some examples of this were found in the work supported by United Nations Border Relief

Organisation (UNBRO) and the Thai military in the Thai-Cambodian border region, where volunteer untrained teachers used the facilities of a mobile unit for village-based instruction. The Department of Non-Formal Education uses micro-planning techniques which bring together mass media, locally produced educational technology, folk plays, dance and demonstrations to support the work of the local teachers in meeting community-defined training needs. A basic problem in analysing the impact of substitute training technologies is, however, the paucity of information about the cost of training in most developing countries. Dougherty (1989) points out that the unit costs of different types of education and training are very seldom estimated. Without this information it is very difficult to select one training mode rather than another on cost grounds or to determine priorities. Distance learning is, for example, advocated as a cost-effective form of training delivery, but we found little evidence of its having been costed and evaluated in developing countries. ILO has promoted such learning for entrepreneurs in Cote d'Ivoire, and it has been costed as a low cost way of reaching 4,000 trainees (Bas, 1987). The issue of cost information is a broader one than just of costing alternative training strategies, and is addressed in our conclusions.

IMPROVING NEEDS ANALYSIS AND TARGET-SETTING

44. The 'signals' by which the providers of education and training recognise changing needs and new targets come from within the education/training sector and from the external business environment. This section examines deficiencies of the common manpower requirements forecasting techniques, before outlining alternative approaches which are relevant both to national planners and to individual technical institutions. The section concludes with a review of some low cost experiments and pilot strategies in this field.

45. Traditional manpower requirements forecasting techniques have been by far the most common ways of determining training needs in developing countries, not least because of World Bank requirements that requests for loans and project proposals be justified by such forecasts (Psacharopoulos & Woodhall, 1985). This approach has led to major distortions of education and training provision, for example in Tanzania and Indonesia. It is flawed because it is based upon inaccurate forecasts of a country's economic growth, and because it assumes falsely fixed relationships between labour provision and industrial output on the one hand and between labour productivity and educational levels on the other. The labour market operates in more complex and more flexible ways than the crude manpower requirements model assumes, and is not wholly dependent on the outputs of the formal vocational and technical training system. Belatedly, the weaknesses of this approach are being recognised even in The World Bank (Adams, Middleton & Ziderman, 1991), who propose an alternative strategy which shifts the focus away from occupational statistics towards educational qualifications.

46. These 'labour market signalling' techniques can be employed by central planning units, but also by individual and groups of education and training institutions. They include:

a) **reverse tracer studies**, which:

- survey sample employee groups in a selected occupational sector;
- map the diverse entry routes and qualifications into specific jobs within that sector;
- cost the various training routes; and
- identify cost-effective training strategies - while shifting public subsidies away from less efficient forms of training provision.

b) **labour market signals**, tracked through:

- job advertisements in newspapers and journals;
- employer surveys of skills training needs and incoming new technologies;
- identifying wage level shifts which indicate skills shortages;
- analysing labour market segmentation created by restrictive entry practices and wage rigidities.

c) **skills analysis**, differentiating those skills which require long lead times and, therefore, long training programmes from those which can be acquired swiftly as needs arise; and identifying forthcoming skills needs (e.g. with planned industrial growth or new technologies) which are unlikely to be anticipated by the private training sector, and which, therefore, require public sector investment. Analysis of entry qualifications for training programmes distinguishes between those pre-entry skills required for successful skill acquisition on the programme, and those entry requirements which do not relate to training needs.

47. Much of this work needs to be undertaken by (or for) individual training institutions. Through their analysis of local labour market signals they should be able to adjust their programme provision to meet more closely the needs of the local labour market. There is, however, also the need for central support, redirecting the energies of central manpower planning teams (whether in Labour or Education Ministries) to:

- undertaking national and regional employer surveys;
- analysing census and other population data;
- training staff in institutions and local manpower planning boards in relevant techniques;
- publicising findings and specifying cost-effective training routes to students and employers.

A basic principle is that information should be specially collected only if absolutely necessary. Wherever possible existing data sources should be exploited, including government employment and social security records, census information and other household data. The labour market monitoring system should:

- identify occupational sectors which are growing and declining;
- define qualifications needed to enter particular occupations;
- identify distortions arising from government policies; and
- assess the performance of education and training in achieving job placements.

48. Evidence from Thailand and Nigeria suggested that labour market signals are not collected systematically there - or if they are they are not used formally in planning provision of technical/vocational education. While traditional manpower forecasting techniques are widely discredited there, no effective substitutes have yet been developed, while (at least in Nigeria) other labour market signals are overruled by governmental distortions of the labour market. This is recognised as a serious constraint upon future Thai international competitiveness (Thailand Development Research Institute Foundation, 1991). Investment is needed to ensure efficient collection and analysis of labour market information. Proposals in Thailand for a new national coordinating agency to collect and analyse information on manpower issues (a "Human Resources Centre") may go some way towards tackling that country's problems, but does not solve the basic problems of persuading industry to analyse and feed-forward its likely future skilled labour needs. The Thai Government is looking at the German 'dual system', while recognising that its basis in the German Chambers of Commerce presents major problems of adaptation to overseas environments. The establishment of new devolved and business-led organisations in the United Kingdom tasked to relate labour market information to training needs (the Training & Enterprise Councils and the Local Enterprise Companies) are too recent an experiment to be able to judge whether it is effective in its native context, let alone whether it is exportable.

49. Low-cost experiments which attempt to reform the training system through the provision of incentives have been attempted in Singapore, Cote d'Ivoire and Chile. In the latter country tax exemptions were used to encourage employers to use private training provision, while in Singapore a national agency was established to stimulate development of specific industries by attracting foreign investment and luring employees from other industries with attractive offers of training for skill-upgrading. Tax policies, whether by incentive or levy, have a chequered history, and seem to benefit those large and multi-national companies best able to cope with the usually cumbersome bureaucratic requirements.

50. Examples of small scale intervention where there is very limited labour market information available can be found in Laos (Adams, Middleton & Ziderman, 1991). In Togo the World Bank has funded a Training and Employment Observatory within the Ministry of Technical and Vocational Education to review existing information sources and provide feedback to training institutions on the relevance of their training provision. The Observatory is intended to use existing information wherever possible and only in exceptional circumstances to conduct specific data collection activities (World Bank, 1990).

NEEDS ANALYSES USING EMPLOYER, COMMUNITY AND TRAINEE PERCEPTIONS

51. If providers are to improve their links with the labour market they need structured procedures for sampling the opinions, attitudes and needs of employers. They also need to ascertain the views and expectations of the community and the students they serve. These form important elements of the management information systems with which institutional managers can monitor their responsiveness internally and externally. This section reviews some needs analysis strategies, including the use of 'social audit' techniques, and focuses upon the specific problems of meeting the needs of female participants in vocational education. In the United Kingdom simple structured data collection techniques

for sampling employer and student opinions were developed by the Employment Department-funded 'Responsive College Programme'. These are not only used extensively in British colleges, but have been adapted by UK consultants for use in developing countries. They form part of a portfolio of measures whereby institutions seek to test the relevance of their activities, and thereby tune provision more closely to client needs. They complement, therefore, the less structured findings from work placement visits, job fairs and employer advisory committees.

52. ILO and SIDA have cooperated in the production of a series of manuals designed as a "systems methodology for the planning, training content design, delivery and evaluation of vocational training for the rural poor of developing countries" - "Training for Rural Gainful Activities" (TRUGA). These include simple community and employer surveys, and task-based techniques for the development of training content. They strongly emphasise simple needs analysis strategies and responses and the importance of close community and employer links. Field tested in Bangladesh and Nepal but written in a country non-specific format, the manuals provide guides for the organisation, delivery and evaluation of training programmes, and provide a basis for the training of TRUGA staff.

53. The work of Thailand's Non-Formal Education Department on the Thai-Cambodian border has been referred to earlier (paragraph 44). The needs analysis here is undertaken by 'resource persons' based in the villages, who work with the community to identify local needs. These are then met through a curriculum structure which emphasises guidance, management and marketing, and planning for self-employment alongside basic and intermediate skills training derived from US vocational curricula. The approach has been evaluated as more successful than traditional directive non-formal curricula, and is being extended to other rural areas in Thailand.

54. The opportunities for women to participate in vocational training remain limited in most developing countries. This is shaped significantly by employer prejudices and social conventions concerning female employment, which steer women into short-term training, into training for careers which can accommodate career breaks, and into socially-defined 'female' fields of study e.g. clerical, secretarial and textile studies. In Thailand evidence was found that these attitudes are changing, as skill shortages encourage the removal of traditional constraints, and the encouragement of women to take up training places in traditionally 'male' areas of study. There is evidence that certificated vocational education helps to overcome employer prejudices against employing women. Cain (1980) has described the impact of a USAID-sponsored project in Thailand and Colombia, which used a 'development training forum' to improve female access to improved technologies and scientific advances in their daily life; and to enhance the planning and management skills of professional women by involving them more centrally in the economic and social life of their communities.

55. The location of training provision is an important element in encouraging greater female participation. Social and religious pressures in some countries require segregated instruction and protected residential environments for female students. Training for adult women is, in contrast, most effective if provided at times and in places close to student homes, so that they can combine domestic and study duties. ILO has highlighted the constraints of female water-fetching responsibilities in the dry season, and the value of drinking water and nursery provision in encouraging greater female participation. The organisation has produced a set of 'general guidelines' on how to integrate women's interests in project design (ILO, 1988). They seek to anticipate possible unintended undesirable consequences for women of a project proposal and specify that project objectives should reflect women's interests and aim for equality of opportunity through project activities which encourage female participation.

56. Underlying the approaches outlined above is the concern for social as well as economic factors when identifying needs and preparing training initiatives. The use of social audit techniques in project appraisal is advocated by ILO/UNDP whose methodology for analysing training systems and their needs (ILO, nd) recommends as a test for project relevance the examination of social needs. These are specified as the extent to which:

- the economically and socially disadvantaged have a fair chance of entering and completing training;
- there are special programmes to cater for illiteracy; and
- there are public programmes to increase access to training.

57. Other work on 'social impact assessment' includes De'Ath's (1982) proposals for a structured approach which starts with an analysis of community perceptions of its social and economic framework, and matches this against possible social and economic changes introduced by a development project proposal. The development team thereby builds a relationship with the community so that controversial aspects of the proposal might be resolved by political means. Rather similar proposals come from The World

Bank (Salmen, 1989), in its promotion of 'beneficiary assessment' as a tool for providing project staff with information about community-based factors which may foster or impede project success. The report specifies a number of projects (mainly land-use and housing) which have used beneficiary assessment. They emphasise that the local political processes must be thoroughly appreciated, and warn against making assumptions about the legitimacy of formal community leadership. Barriers to effective community communication and participation are identified, and the report recommends the more widespread adoption of beneficiary assessment in order to make the World Bank more responsive to its clientele.

DONOR AGENCY STRATEGIES FOR ASSESSING SYSTEM NEEDS AND AGREEING INTERVENTION STRATEGIES

58. Evidence has been collected from The World Bank, USAID and UNDP/ILO on their strategies for assessing system needs, agreeing intervention strategies and preparing project specifications. The World Bank is the largest single provider of external funding for educational development, and its shifts in investment policies have been charted by Haddad et al (1990). Its Population and Human Resources Department Education and Employment Division (PHREE) is now actively involved in implementing the new Policy Papers "Vocational and Technical Education and Training" (1991) and "Skills for Productivity" (1992). This major policy shift is based upon an exhaustive analysis of over 600 World Bank studies and consultations with over 50 developing country governments. Implementation strategies are spelled out in a forthcoming text (Middleton, Ziderman & Adams, 1992), which has been distributed in draft for comment before publication. Operational details are the subject of internal memoranda and related documentation, including a complex computerised framework for project appraisal. The basic themes are the need for a sound general education base, the need to encourage private sector and employer-led training, and the need to improve the efficiency of market forces as key determinants for training provision. Needs analysis should focus upon the labour market signalling strategies indicated above (paragraphs 46 & 47), to enable more effective analysis of the entire available sources of skills development. This would then facilitate the switch to a demand-led rather than supply-driven training system, in which the private training sector would be a far more dominant element. In contrast to the substantial evidence base used in analysing the problems, the evidence for suggesting solutions is limited and speculative, drawing very heavily upon recent experiments in the small African Republic of Togo (World Bank Africa Technical Department, 1991).

59. Few lessons can be drawn from USAID's approach, with which the organisation itself expresses considerable dissatisfaction. The national 'hearts and minds' policy, justified politically in terms of the multiplier effect upon local economies of large numbers of foreign students, focuses heavily upon US-based, certificated provision. In 1990 nearly 20,000 USAID participants were enroled in over 700 institutions of higher education and 700 other organisations. Training needs are primarily identified in terms of US-based training awards, which are then managed by nearly 200 private contractors. There is little evaluation of programmes - mostly off-the-shelf provision - and no apparent evaluation of outcomes. Success rates are only now beginning to be sought, and there have been no tracer studies to examine the impact of this enormous investment in training. The comprehensive 'Participant Handbook' (USAID, 1990) offers some useful guidelines, however, to contractors and others on the management of training, on needs assessment and on training cost analysis, as well as the more specific guidelines on the selection, reception and placement of trainees. Needs analysis is undertaken by locally based US mission staff, who prepare a five-year projection of training needs (updated after two years) in the form of a "Country Training Plan". The Plan includes specification of needs for skilled and professional labour, related to USAID's own priority development areas, and an analysis of training constraints, including host country policies and labour market distortion. The needs assessments should draw upon a range of data sources (specified in the Handbook) and should give special attention to the participation of women. The cost analysis system uses a standard checklist to prepare cost proposals, before placing the training contract out to tender. The Handbook also contains cost analysis and budget estimate worksheets, together with standard reporting formats.

60. ILO and UNDP have developed a range of guidance notes and instruments for project design and evaluation over the past decade. The UNDP "Guidelines for Project Formulation" comprise a project formulation framework to guide needs analysis, an annotated format for preparing project documents, and a project appraisal checklist. The first document distinguishes between target beneficiaries and direct recipients, includes a risk analysis, and seeks evidence of host country commitment and other donor agency involvement in related fields. The second document explicitly relates inputs and outputs to project activities; while the third structures the scrutiny of the completed project document as part of the approval process. The three instruments come together in a slim 39-page manual, to be used as a comprehensive set of instructions for the formulation of all UNDP projects. ODA might wish to compare this approach with its current procedures for analysing

needs, preparing a project specification and appraising that specification.

61. ILO's Vocational Training Branch has also developed a useful framework for sector analysis (ILO, nd). This has been designed to identify training alternative strategies and their implications, in order to inform rather than prescribe to governments and others. The analysis focuses upon four key questions, concerning:

- problems which might be resolved through training;
- destinations of graduated students;
- skill levels of typical work force groups; and
- the extent to which employers and individuals are prepared to pay for training.

A detailed checklist focused upon these issues includes analysis of efficiency, effectiveness and relevance of training. It is constructed so as to conclude with a preferred strategy for systems improvement, with specified priority objectives. ILO/UNDP recommend a feasibility study procedure involving an economist, labour market specialist and training specialist. Current concerns include ways of introducing increased decentralisation, devolving responsibility for training systems by providing relevant incentives to make trainees want to learn and make employers take on more responsibility for training and curriculum development. In-country analyses should indicate the most appropriate local incentive systems. This implies closer involvement with both the local political systems and with employers' organisations.

62. More generally, the contrasts identified in the Interim Report between donors of bilateral assistance were confirmed in Thailand. However, there did not seem to be significant differences of sustainability between projects prepared with tight donor specifications and donor-initiated blueprints, and those characterised by donor responses to host country requests for help. The analysis of political forces, alliances and interdepartmental rivalries seemed to be better predicators of sustainability than inherent project preparation characteristics. For example, the British Council-managed project establishing the Thai Institute for the Development of Educational Administrators has survived with some success for nearly a decade - but is now threatened by the ambitions of other ministerial departments for their own staff development centres, and the Department of Vocational Education's aspirations for its own 'staff development institute' are being supported by ILO/UNDP (UNDP, 1991).

ASSESSING THE CAPACITY OF EXISTING TRAINING INSTITUTIONS

63. The capacity of training institutions to deliver education and training can be measured in two ways - the physical capacity, assessed in terms of space and equipment available; and the human resource capacity assessed in terms of the instructors and support and administrative resources available. Techniques for assessing the space utilisation levels of technical institutions against their overall capacity have been developed in the UK for the Department of Education & Science (Kenny & Foster, 1986). These simple techniques, by which the utilisation of premises in terms of both frequency of use and occupancy can be measured, are widely used by British further education colleges and polytechnics, and have been applied by British consultants in assessing the capacity of technical and vocational institutions in developing countries. Rather different approaches have been applied in Germany (Jokusch, 1977), which take into account user motivations and perceptions in assessing capacity. A firm distinction should be drawn between the norms established as a guide to building technical institutions, and those employed when using that space. Both UK and German approaches emphasise that people's perceptions of capacity are far more significant than building norms based upon notional allocations of area to users. Nigerian studies indicate that perceptual capacity can exceed building norms threefold - so that the application of building norms as capacity measures can lead to serious under-utilisation of space.

64. The assessment of an institution's human resource capacity presents rather more complex problems. Although there is a widespread belief that small classes lead to improved learning, the research evidence to support this is equivocal. Class sizes in many countries exceed the maximum number that can efficiently be trained, given the workshop sizes and equipment availability. However, there is evidence in some countries that vocational training is becoming less attractive an option for potential students, and here under-utilisation is experienced because of low enrolment. Furthermore, where specific courses decline in popularity there is a marked reluctance to discontinue the provision and to use the resources for alternative, and probably more relevant, offerings. Countries with centrally planned curricula are particularly vulnerable to these inefficiencies.

65. A rather different strategy for assessing an institution's training capacity involves the curriculum skills analysis referred to above (paragraph 39). By focusing upon the teaching time - and particularly the workshop time - needed in order to acquire specified skills and knowledge, it may well be possible to challenge assumptions about course length and

content, reducing the total amount of training time, and escaping from formula-based prescriptions about total numbers of workshop hours necessary for course completion and certification. A variant of this approach is to shift some, or all, workshop experience to employer premises as part of a work placement programme or a 'dual system'. This is considered in more detail in paragraphs 77 and 84 below.

66. Other factors leading to under-utilisation of both physical and human resources include under-recruitment, student drop-out and course or year repetition. It is common to find class sizes significantly smaller than planned because of under-recruitment in spite of heavy demand, particularly in post-school institutions where students can accept places at several colleges or universities, and fail to inform those institutions offering them places that they are studying elsewhere. Student drop-out, often from the beginning of the academic year, accentuates this problem, as when students are unable to pay their fees. Blanket course or year repeat policies are extremely inefficient of both space and student time. All these can be addressed through more flexible planning, which estimates non-acceptance and drop-out rates, and deliberately over-recruits on that basis. Curriculum skills analyses, course modularisation, and the analysis of entry qualifications against course failure statistics can all help to eradicate the wasteful repetition of whole courses or study years.

MORE INTENSIVE USES OF FACILITIES AND EQUIPMENT

67. Techniques for increasing an institution's physical capacity to deliver training focus primarily on ways of extending the period of time over which the institution's facilities are in use. This section and the next two sections examine different ways in which a training system's physical assets (premises, facilities and equipment) might be used more intensively. A first step is to know accurately the extent of the available assets. This argues for the establishment and regular maintenance of institutional assets registers, which record the location, costs, maintenance requirements and utilisation of the physical assets. With such information it is then possible to analyse ways in which some assets are under-utilised, and others might be even more intensively used. Space utilisation surveys (Kenny & Foster, 1986) point to the inefficiency of departmentally-managed space, particularly where a department or course leader holds classroom and workshop space, and uses one or the other but never both simultaneously. The introduction of centrally managed non-specialist classroom space to ensure higher utilisation levels is an obvious (but often politically difficult) step to improving utilisation. However, the more intensive use of space can lead to perceptions of over-crowding which inhibit learning, and to the rapid deterioration of over-used facilities. This requires an institutional culture and management which gives high priority to environmental care, maintenance and immediate repair and renewal when deterioration is identified. This is examined in more detail below, in paragraphs 75 & 76.

68. The introduction of double shifts has enabled well-equipped colleges in Thailand, as in other countries, to double their throughput. Staggered holidays can similarly increase the total amount of time in which facilities are being utilised. The adoption of income generation targets focuses attention upon ways in which facilities might be used more intensively in order to achieve those targets. Examples of this were observed in both Nigeria and Thailand. Careful costing is necessary to ensure that the real costs of using space and equipment are charged to clients from industry and business, and that appropriate re-investment is made in repair and maintenance.

STRENGTHS AND WEAKNESSES OF CENTRALISED WORKSHOPS

69. The investment in centralised workshops is a controversial issue in many countries. Although in some countries centralised workshops have proved expensive failures, evidence from Latin America points to the benefits of industry-sponsored central training centres, as pioneered by SENAI and SENAC in Brazil. Today there is a wide range of such provision throughout Latin America. CINTERFOR (1991) distinguishes between 'regional centres', 'specialised centres', 'sectoral centres' and 'polyvalent centres' (with several specialities under one roof). There are also 'technological centres', which undertake training, research and technological development, and which, at least under SENA in Colombia, include library, information technology, cultural, convention and social facilities, described as a "self-service educational (technological) supermarket". Centralised workshops are also found in Singapore and Japan (Salome & Charmes, 1988). They are able to respond to technological and market shifts, and meet industry's needs for specialist training where new skills are required.

70. The provision of mobile units from a central base offers an alternative means for economising on expensive provision of facilities and equipment. Again, the evidence for its efficacy is mixed. In Thailand the Department of Vocational Education (DOVE) used mobile training units for a number of years before abandoning them. They failed partly because of the damage incurred to equipment on long journeys along poor roads, but mainly because of the reluctance of

staff to accept the itinerant working conditions required with such units. However, the Department of Non-Formal Education has been more successful. It uses two types of mobile unit: trailers (acquired from DOVE) carry substantial equipment for up to one month's intensive skills training from a central base to outreach centres in the more remote rural areas. Staff then return to the base training centre and resume duties there while another team takes out the trailer. The Department also uses buses with audio-visual training aids and light equipment for one- to three-day village based workshops. These do not travel far from the main centre, so that staff commonly return to their own homes at night. The Department's 'mobile vocational market project' extends this by using students to sell both technical advice and services (e.g. typing letters) along with student-made products to villagers from the travelling market.

RECURRENT SUPPORT FOR WORKSHOPS, TRAINING CENTRES AND MAINTENANCE INFRASTRUCTURES

71. This section examines donor policies concerning the supply of equipment to technical institutions and the policies for recurrent servicing and maintenance. It focuses upon the issue of a maintenance culture and infrastructure, and looks at one example of this from Thailand. There are marked differences in national policies concerning recurrent support for workshops, training centres and equipment provided through bilateral aid or loan projects. A recent World Bank analysis of patterns of international support for technical education points to a shift in focus from the establishment of new facilities to the rehabilitation of existing provision (Middleton, Ziderman & Adams, 1992). While the major form of bilateral aid identified in this analysis is for technical assistance, commonly in the form of expatriate teachers (French aid in particular predominantly takes this form), Japan's aid is concentrated in equipment purchase. This is the second most common aid form, with Germany, Italy and Canada also favouring this form of support. Scholarships and fellowships for training abroad forms the third most popular aid category, particularly from USSR, while construction aid came mainly from multilateral agencies, particularly the Inter-American Development Bank.

72. The more efficient organisation of equipment procurement and supply presents ways in which cost reductions can be achieved. It is vital to ensure that the equipment provided is relevant, readily maintained and repaired, and sufficiently robust to operate in conditions which may be substantially different from those for which the equipment was designed. Problems were identified in Thailand where equipment provided under a UNDP/ILO project had not been 'tropicalised' before delivery, and was, therefore, subject to the vagaries of intense heat and high humidity. The detailed procedures for equipment supply through ILO's Equipment and Subcontracting Branch (EQUIPRO) do not seem to include such requirements as standard. Its policies of seeking to buy from developing countries and from 'under-utilised major donor countries' may result in new suppliers being relatively unfamiliar with the conditions under which their equipment will be used. However, EQUIPRO does monitor the intensity of links with suppliers, and provides training in procurement management at ILO's International Centre for Advanced Technical and Vocational Training in Turin. EQUIPRO also produces equipment planning guides, comprehensive illustrated catalogues of tools and machinery used in 17 occupational areas. The organisation handles about 10% of ILO's technical cooperation budget, and uses productivity indicators to demonstrate its cost-effectiveness (ILO, 1990).

73. The provision of modern equipment is high on the wish-lists of every technical institution. Evidence of supply by multi-national, national and enterprise donors can be found in most technical institutions in the developing world. Equipment from over 20 donor countries was seen in technical institutions in Thailand and Nigeria. Evidence of effective utilisation policies is harder to find. Problems abound of equipment inappropriate for training requirements, of equipment without operating instructions (or with instructions in an untranslated language) or competent staff, and of equipment awaiting installation - and deteriorating in adverse climatic conditions. In Thailand the Rajamangala Institute of Technology (a department of the Education Ministry with 30 campuses) has successfully persuaded major employers - including AT&T, Mitsubishi, Minibear and Peugeot - to donate relevant equipment. Mitsubishi also supports the Institute's Continuing Education Centre, from where service teams maintain equipment on a cyclical basis across the Institute's campuses. Such provision is particularly cost-effective as it reinforces links between employers and providers, and is likely to provide equipment similar to that which trainees will find when joining that employer. It further enables the training institution to offer in-service training to the employer using the donated equipment, while the donor enterprise can offer ready support for maintenance and repair, and can train teaching and technician staff in the relevant techniques.

74. Many of the field problems encountered were due to the absence of recurrent maintenance once equipment had been commissioned. Such support needs to be inbuilt. German support for vocational education in Thailand was reported as taking the form of post-project cyclical visits which combine staff training and updating together with free regular servicing for equipment provided through the project.

This is related to current experiments in the introduction of the German 'dual system' to selected Thai colleges, where recurrent support for college workshops is seen as an interim substitute for available local industrial experience. Japanese support took the form of premises and equipment provision, backed by a fixed proportion (10%) of the total project budget in the form of spare parts, but no structured post-project contacts. The Austrians were reported as evaluating a long-completed project, and providing additional training and equipment support on being satisfied by the project's sustainability and the maintenance culture at the college.

75. Such a 'maintenance culture' provides a foundation from which to ensure the care, extended life and more intensive uses of equipment. The creation of a maintenance culture is a major step towards more cost-effective technical and vocational education. It comprises two distinct but related elements. One involves the skills and attitudes of teachers and instructors: the other, institutional management priorities and techniques. A common problem throughout much of the developing world is the career route into technical and vocational teaching. Restrictive entry practices confine posts to those holding specific qualification levels, even where, as in Nigeria, these may bear little relationship to the requirements of the teaching post. The result is that artificial distinctions with real wage differences are drawn between lecturers, instructors and technicians. Discrimination in favour of university graduates and against those who have acquired relevant skills through work experience, encourages perceptions amongst both staff and students that theoretical learning is 'better' than practical learning, and that teaching theory denotes higher status as well as higher wages than workshop teaching. The lack of practical experience of these teachers means that they have neither the skills nor the inclination to care for and maintain the equipment and facilities central to their teaching. In Thailand the absence of any technical support for teachers has encouraged a culture in which teachers, even though they have followed an academic route into their posts, acquire basic equipment maintenance skills on the job and through industrial placements. This is supported by a climate in which teachers are expected to cover both theoretical and practical elements in the curriculum, and to get their hands dirty where necessary in handling and repairing equipment. It is also in tune with aspects of the indigenous Thai approaches to learning (Tunsiri, 1990). The Rajamangala Institute of Technology encourages this with an induction programme for new staff involving a study tour of relevant Thai industries. Other examples of encouragement for this process were observed in a UNDP/ILO project near Bangkok, where long-term consultants trained local counterparts in both teaching and maintenance skills.

76. At the same college, firm support for this was provided by a principal who lays great emphasis on the environment in which learning takes place, insisting upon a tidy, well-tended environment within and outside the college buildings, and holding departmental managers accountable for the quality of the physical environment within their control. As a result, equipment provided through World Bank and other aid projects over twenty years ago was still in daily use. This approach is supported by a wealth of research into effective school leadership, which points to the positive relationship between institutional effectiveness and top management involvement in quality assurance and quality improvement. Such a 'maintenance culture' includes the establishment of a tidy, clean environment; the careful husbanding of materials; the monitoring and careful storage of materials and moveable equipment; and the regular scrutiny of premises and equipment in order to identify and anticipate potential problems before they require expensive solutions. This is reinforced by the expectation that self-help, through student labour, will be the most likely or even the only affordable resource for repair and maintenance. This was starkly demonstrated in an extremely impoverished Nigerian polytechnic, where staff and students had built and renovated workshops, and had converted the crates in which (unusable) expensive Czech equipment had been converted into basic seating. While the cultural obstacles to the adaptation of the Thai model elsewhere are considerable, the ODA might wish to review its current policy concerning equipment provision, and experiment with some limited relevant provision as part of a broader package of support which included:

- spare parts provision;
- staff training in, and incentives for, regular maintenance and repair procedures, and in simple self-help strategies;
- management training; and
- environmental enhancement.

LINKING WITH NON-FORMAL TRAINING AND APPRENTICESHIP SYSTEMS

77. The two final sections examine the central problem facing training systems throughout the world - that of improving the linkages between training providers and their clients in business and industry. The first section looks at the informal sector, reviewing the contributions of apprenticeship and other training systems to the development of training skills. The next section examines the formal employment sector, assesses the contributions of private training providers,

and considers some common problems in linking training providers to industry.

78. Evidence for close and effective links between formal vocational education and the non-formal and apprenticeship systems is hard to find. The German 'dual system' of apprenticeship is always cited as the successful linkage which provides the necessary pool of skilled labour. Cultural determinants - in particular the high status of the 'meister', the constraints upon competition among firms for skilled workers, and the flexibility of the educational institutions in adapting their offering to industry's needs - all present problems of transferability, as has been found in Thailand despite substantial aid from GTZ. Major difficulties occur when attempting to shift the costs of training to the trainees (normally achieved through low wages which rise steeply when apprenticeship is completed). There are also major logistical problems in attempting to provide on-job work experience/apprenticeship and off-job training and education in an economy with only limited links between education and industry. Experiments such as the 'training voucher' and a training levy on firms which do not fund their own training are being considered in Thailand in order to tackle these problems.

79. The informal employment sector depends more on private apprenticeship training than on publicly-provided vocational and technical training. The nature of the sector, with much less division of labour and specialisation of roles than in the formal employment sector, requires general basic skills rather than the specialist skills learned through formal training. The prime purposes of training in this sector would seem, therefore, to be increased productivity and greater flexibility across work tasks. The role of apprenticeship systems, based on off-the-job training in public vocational training institutions and on-the-job work experience, seems to be diminishing in importance as a mode of vocational training in many countries - both in the developing and the well-established industrialised economies. While these types of apprenticeship systems are likely to be maintained for the foreseeable future, increasingly they will be under pressure to reform and to adapt to the pressures of changing technological and organisational requirements within sectors/industries confronted with the need to be innovative and flexible within highly competitive markets. Without a conceptual base, such apprenticeship training is likely to be less efficient in developing sophisticated skills than other forms of training. Other problems include the low productivity of apprentices while they are confined to specified low-skill tasks and the long period of time needed to complete many apprenticeship schemes (Dougherty, 1989).

80. However, traditional apprenticeships in small enterprises still provide a significant input to vocational training in many developing countries - particularly in North and West Africa and in Latin America. Most such apprenticeships are based solely on experience gained on-the-job by observing experienced workers and performing work under tutelage on commercial jobs. In most cases, the employer/master is paid a fee by the family of the apprentice who is usually contractually bound to the master. In their current form, such traditional apprenticeships are unlikely to enhance the level of technology used in the informal industry sectors where they constitute the main form of training. However, they do have the advantage of being financed by the trainees themselves. With improving access to primary and lower secondary education, an increasing number of such apprentices will have acquired at least basic literacy and numeracy skills. Furthermore, traditional apprenticeships have the advantage of adapting to local needs, of combining both production and business skills training, and of generating positive attitudes to work - a task which formal off-job training often finds difficult.

81. There would, therefore, seem to be the potential for introducing programmes aimed at upgrading the technological skills of workers who may have completed such apprenticeships and are ready to establish their own businesses - thus raising the level of technology in some of the informal sector industries. Indeed, a study by Birks and Sinclair (1990) identifying sources of firm-owner skills in the informal sector, Ibadan, Nigeria, revealed that young entrepreneurs were better educated than their older counterparts and more likely to use electric power, to keep written accounts and to use such aids as calculators in running their businesses. There is also evidence that the apprenticeship system is evolving to meet the needs of newer industries, whose apprentices have a better general education than those in traditional industries. The same Nigerian study found that training fees were substantial, enabling the emergence of low-cost training schools selling apprenticeship services. This suggests that some encouragement of the apprenticeship system might promote low-cost informal training, and the Nigerian government's attempt to expand apprenticeship deserves careful monitoring. The master-apprentice relationship, central to the system, may well be vulnerable to government interference, however well-meaning. Dougherty (1989) catalogues some examples of interventions to support indigenous apprenticeship, but these appear fragile, and he also points to governmental interventions which have handicapped the informal sector. The most significant governmental contribution would seem to be, therefore, the assurance that trainees enter apprenticeships with functional numeracy and literacy.

82. The contribution of formal vocational education to the urban informal sector must not be overlooked. In Thailand nearly 20% of those with such vocational training were working in the informal sector, although other trained workers preferred to wait for employment in the formal sector. Governmental distortions of the labour market restrict the flow of trainees into the informal sector, particularly where, as in Egypt, graduates are guaranteed public sector employment, and where minimum wage levels are maintained in the formal sector. These combine with heightened student expectations to form barriers to transition from vocational training into the informal sector, even though the employment opportunities may be greater in this sector. High unemployment levels argue for the removal of such barriers. Training is more cost-effective if its products are able to use their skills in both formal and informal employment sectors rather than for those skills to deteriorate through unemployment. The flow of substantial numbers of trainees into the informal sector and into self-employment has implications for the curriculum, and tests the flexibility of training provision. The Nigerian government has now placed high priority on training for self-employment, with a focus on training for entrepreneurship, but this does not fit comfortably alongside standard curricula. A more fundamental re-evaluation of the purposes of technical/vocational training provision is needed if these reforms are to be accommodated successfully.

83. In the rural informal sector the 'education with production' movement has sought to integrate more closely productive activity with education and training. Although it has been implemented mainly in centrally planned economies, its basic lessons seem readily transferable to market economies. Cabral de Andade (1990) has identified the success factors in developing training centres as centres of production, whose outputs can help to fund the centre's costs. Economically feasible production and marketing schemes need to be backed by active community support, proper regard for workers' rights and by profit-sharing to benefit students and their families. Examples include Algeria's Office for Productive Works in Vocational Training, Cuba's National Pioneer Centre and Costa Rica's 'Public Training and Production' workshops. Tunsiri & Somtrakool (1990) point to similar features of the Thai Non-Formal Education Department's work on the Thailand-Cambodia border. The social and political goals of stabilising the rural population after the incursion of armed Khmer Rouge forces were achieved by emphasising self-help and self-reliance, using village-based training as a means of establishing a sound local production base.

IMPROVING LINKS WITH LOCAL INDUSTRY: THE FORMAL SECTOR

84. There seems little doubt that effective vocational education depends upon close links between the education and training providers and the industries which, either consequently or concurrently, employ the trainees. Unfortunately there also seems little doubt that in most countries (including the United Kingdom) it is extremely difficult to establish close, strong and lasting links between the worlds of industry and training - especially public sector training.

85. The most widely advocated strategy for linking education and industry is the German 'dual system'. The problems of adapting this to developing country requirements have already been mentioned. In Thailand work placement on a block release basis is being introduced as matching more closely local conditions than a fully-fledged 'dual system'. In Nigeria the 'Structured Industrial Work Experience Scheme' provides four months' work placement for students on specified courses, with students funded through a national Industry Training Fund, which also provides financial incentives to employers to take trainees. The scheme is sufficiently successful for some institutions to extend it to non-specified courses, even though funding is not available for those students or employers. The work placement approach would be particularly effective if it enabled institutions to avoid or even withdraw from some forms of high-cost workshop training provision, on the grounds that the experience and skills could be learned on work placement. Evidence for this could not, however, be found in developing country systems. Nor could evidence be found of work placement being organised so as to provide specified work-based learning, as measured through structured work-based assessment. Both are being introduced successfully - if slowly - in some areas of UK training (Levy, 1992), and they offer significant theoretical means for achieving cost reductions in technical education in developing countries.

86. Evidence from Thailand supports the world-wide messages that large and particularly multi-national employers recognise the advantages of influencing and making use of available public sector training, devoting significant resources and a dedicated organisational component to these links. In Thailand, not surprisingly, the firms cited as working most closely with the colleges were the Japanese conglomerates Toyota, Mitsubishi, Isuzu and Minibear, the American AT&T, and the French Peugeot (also active in Nigeria) and Citroen enterprises. The areas where collaboration between industry and education is most fruitful are those with the greatest skill shortages - the Greater Bangkok region and the new oil-based developments on the Eastern Seaboard.

87. In contrast, the Thais face familiar problems in seeking collaboration between colleges and

industry in rural areas and with small and medium-sized industries, particularly where these are recently established, locally-owned, and dependent on poaching skilled staff from larger organisations with a training culture. In the area of non-formal education, freedom from a centrally imposed curriculum has enabled colleges to deliver to local industries short, intensive and inexpensive training courses focusing upon skills identified by industry, with the help of locally-based, college-funded 'resource persons', whose task is to identify local industrial and community needs. This is, however, recognised as an expensive strategy, possible because of government priorities in sensitive border areas, and supported by the armed forces and UNBRO.

88. Private or proprietary training is a significant contributor to vocational and technical provision in a number of countries. Anderson (1991) has recently reviewed the contribution of proprietary colleges in the United States, pointing out the considerable efforts and investment made to raise funds for students from a plethora of federal and state government grants and loans during their studies, and to place graduates in employment on competing their training. In Thailand, private vocational colleges train nearly half the total secondary and post-secondary vocational students, and are required to teach the standard government-prescribed curriculum. Interestingly they are regarded by the public sector colleges as poor relations to be supported rather than as competitors. Although The World Bank has argued for the encouragement of private sector and employer-based training, Haddad *et al* (1990) have queried the validity of studies which point to the greater efficiency of private education. We found little evidence of market forces operating effectively to encourage such training, or of the private sector responding more positively than public sector institutions to changing needs. There are concerns about the quality of private sector institutions, and no evidence that they are more successful than those in the public sector in obtaining and using information about industry's training needs.

89. The problems of involving small to medium enterprises in training has been tackled with some success in Chile and Mexico, where small enterprises from a given sector have been grouped together in branches and relevant training is either directly provided by an agency set up for the grouping, or by hiring in training. The user enterprises are charged on a pro rata basis, but are able to deduct these costs from their taxes, using appropriate tax incentives. These can be relatively low-cost interventions, given the fact that such enterprise training is usually more cost-effective than public sector provision. Where governments provide support (possibly with the help of bilateral or multilateral assistance) in the form of the necessary infrastructure and incentives, this can represent a significant attack on an intransigent world-wide problem.

90. In reviewing the role of vocational training institutions in the Latin American countries, CINTERFOR/ILO has identified significant shifts in focus of their training remits. These include a move away from primarily providing pre-employment training and apprenticeship programmes, towards making greater provision for upgrading training for workers - more closely aligned to the jobs they are employed in - through short, more cost effective courses. Increasingly these providers of vocational training seem to be adopting strategies aimed at facilitating economic restructuring within their developing economies, by developing the ability of industry to increase productivity, competitiveness and quality. As a result, more emphasis is being given to organising training by industry sectors and to expanding the provision of specialised training to middle management, technicians and technologists. Simultaneously, enterprises are being encouraged - chiefly through tax incentives and legal obligation measures - to assume responsibility for training their own workers. Such measures, combined with the direct participation of some training centres in transferring training provision to selected enterprises, has resulted in a small but growing take-up of enterprise-based training - but such involvement has been restricted to fairly large enterprises.

91. Underlying a number of the attempts discussed above to link more closely employers and training providers, is the view that employers might take training more seriously if they have to pay for it - or at least for part of it. And this is an obvious way of reducing the burden of vocational training provision for hard-pressed governments. Some countries such as Hong Kong impose direct, earmarked taxes to finance training. More commonly, payroll levies are used to finance national training agencies which then provide pre-employment and in-service training centres. Pioneered in Brazil fifty years ago, this strategy has been adopted throughout Latin America and has spread to a number of African and Asian countries including Nigeria (the Industrial Training Fund) and Singapore. Some agencies have attempted to augment their payroll income with direct income generation activities, selling consultancy and even goods. While a logical extension of the levy principle is the provision of financial incentives for employers to develop their own training capacity, we found little evidence of this as a successful strategy, and little support in practice for the ideology which argues for employers taking over responsibilities from the state for training provision. Effective vocational training provision would seem to depend upon the funding, planning and coordination which comes from an effective national training authority.

PART C: CONCLUSIONS: REDUCING THE COSTS OF VOCATIONAL AND TECHNICAL EDUCATION

92. The issues discussed throughout this Report are drawn together here into two groups, with associated recommendations. The first group examines those measures which might be undertaken to reduce the current costs of technical and vocational education by improving efficiency - a series of **efficiency strategies** which improve the ratio between measurable inputs and outputs. The second group examines ways of making technical and vocational education more effective by improving the quality of its outputs, and by focusing more closely upon the central purposes of that training - a series of **effectiveness strategies.** This distinction is spelled out in the model below. An important proviso must first be made. The extensive literature and field survey undertaken as part of this project have emphasised the differences between countries. Although some broad distinctions can be made between low-income and middle-income developing countries, the differences within these groups repeatedly point to the difficulties of generalisation. The approaches suggested below, therefore, need to be adapted to the distinctive educational and financial situations of particular countries.

INPUTS
efficiency
strategies

TECHNICAL/VOCATIONAL TRAINING SYSTEM

OUTPUTS
effectiveness
strategies
OBJECTIVES

ECONOMIC & SOCIAL NEEDS

Figure 1: Efficiency and Effectiveness Strategies and their relationship to training systems.

Efficiency strategies

93. The Report has indicated a number of ways in which internal measures within technical institutions might reduce costs or increase the efficiency of technical/vocational provision. These include the obvious increased productivity measures achieved through better management of staff and space. Human resource management measures to increase staff productivity include:

- larger classes;
- improved staff:student ratios;
- more efficient use of teacher time on activities geared directly to student learning;
- longer teaching hours;
- compensation packages to provide incentives to cut costs or raise output;
- labour substitution with more technicians and assistant instructors; and
- removal of artificial staff recruitment barriers.

94. Better space and assets utilisation policies include:

- more flexible timetabling;
- longer working days, including double shifts;
- year-round institutional availability;
- centralised space allocation procedures to promote more intensive facilities utilisation;
- simple space utilisation measurement;
- the establishment of more rigorous maintenance and repair procedures;
- materials recycling systems;
- mobile technical training facilities;
- production and student service delivery to generate income for materials etc.;
- curriculum analysis to minimise expensive equipment needs; and
- more emphasis on work-based learning and uses of employer equipment.

We recommend that an increased productivity element should form a part of initial project preparation procedures, and that this should include both human resource and assets (space, equipment and materials) management.

95. The relationship between provision of materials and equipment and the taught curriculum is complex, and is made more so by institutional ambitions to upgrade or diversify their provision leading to requests for equipment more sophisticated and expensive than

is strictly needed. More complex equipment also tends to create greater maintenance and repair problems. Project investment in a curriculum analysis process which seeks to identify the simplest, lowest cost and (if possible) locally made equipment to serve precisely identified training needs, could facilitate investment in both the use and even the production of such equipment.

We recommend that ODA experiments with some limited provision as indicated above, possibly as part of a broader package of support which includes:

- spare parts provision;
- staff training in and incentives for regular maintenance and repair procedures, and in simple self-help strategies;
- management training and environmental enhancement.

96. Further, though less tangible, productivity gains can be achieved by organising student learning so that it reflects more closely the different needs and abilities of individual students. A focus on improving access to technical/vocational education for groups of students ill-served by existing provision - particularly women - can lead to both social and economic benefits. Such strategies are also valuable where decreasing enrolment to technical courses is increasing unit costs. This requires the careful analysis of:

- the skills, knowledge and competences needed in order to undertake specified tasks;
- the pre-conditions necessary for the acquisition of those skills and knowledge; and
- the learning strategies whereby they might most efficiently be acquired.

We recommend that ODA experiments in encouraging the adoption of competence-based learning strategies, in order to reduce the time taken to complete training programmes and accelerate the progress of some students through those programmes.

97. The evidence does not enable certain forms of technical/vocational provision or certain national policies to be readily identified as more cost effective than others. Although the unit costs of private sector and employer-based training are generally significantly lower than those of public sector institution-based education, the two forms of provision are not really comparable. Comparison is further complicated by the absence of information concerning the career progression of graduated students into work placements, and of the relevance placed by employers upon the certification acquired as opposed to the skills learned. It is very difficult to estimate the added value of certification both as a means for attracting able students and as a means of entry into occupations and career routes.

We recommend that reverse tracer studies be used to identify career routes into specified jobs and their relative training costs, before investing in the enhancement of a particular institutional training route, particularly if this involves out-of-country training.

98. This Report has emphasised the importance of thorough, accurate, but low-cost needs analyses in the project preparation and development phases. The availability of comparative cost data is an urgent requirement in many systems. Unless the likely costs and potential benefits of possible actions can be estimated, it is impossible to target investment on those aspects of technical/vocational provision which are likely to yield greatest dividends. This is not to argue for sophisticated (and computerised) cost-benefit analysis systems, but rather the improvement of institutional and national information and planning systems so that relevant data can be collected, stored and analysed. These require both data concerning the internal efficiency of the providing institutions, including comparative data between institutions and over time; and data concerning the labour market, its changing needs, and institutional responsiveness to those needs. The latter is considered below; the former often requires little more than the more intelligent use of data currently collected for administrative rather than management purposes.

We recommend that ODA encourages the collection, analysis and comparison of cost data within and between training institutions in ways which are compatible with existing administrative systems, and do not demand more sophisticated computerised management information systems.

Effectiveness strategies

99. Evidence from a wide range of studies emphasises that the unit costs of vocational and technical education are high when compared with the costs of general education. The reasons for this include the requirements for equipment, specialist facilities and consumable materials; the lower staff: student ratios, particularly in workshop learning; and the higher salaries of technical/vocational teachers in many countries compared with primary and secondary teachers. In seeking ways of reducing technical and vocational education's costs, therefore, a

prime question remains whether investment might more appropriately be made in general primary and/or secondary education. Technical and vocational provision is commonly handicapped by the lack of basic literacy, numeracy and science education of its entrants. Large numbers of technical/vocational students are unable to find work and so make use of their skills in appropriate employment when completing their studies. There is, therefore, a strong case for examining the benefits which might be obtained if governmental or project investment were focused upon general education rather than on the technical/vocational sector.

We recommend, therefore, such analysis as part of the initial project appraisal process, which scrutinises potential blockages to project success because of inadequate entry capabilities.

100. The significance of the relationships between the labour market and the providers of technical/vocational training cannot be over-emphasised. Where such training is cost-effective - in that its graduates get appropriate jobs on completing their studies - links with employers are closer than in economies where graduates fail to obtain such work. Employers as well as students and teachers work to maintain these links because it is in all their interests to achieve an efficient transition from school or college to work. This Report has suggested a number of ways in which links might be improved. But for these to work, employers as well as providing institutions need to want to improve these links; and this will only occur where employers need the skilled outputs of the institutions. While this argues for relevant curricula, well-trained staff, students who are appropriately prepared at the start of their studies, and satisfactory facilities and equipment, none of these are sufficient if the local or national economy is unable to absorb the students when they complete their studies.

We recommend that experiments with institutionally managed labour market signalling be monitored and, where possible, initiated; and that a simple guide outlining the basic techniques and strategies be commissioned.

101. The quality of vocational education and training depends centrally upon the quality of its staff. In too many systems artificial barriers restrict teaching posts to graduates without practical experience, and some even constrain the recruitment of higher technical education graduates in favour of university graduates. If institutions are to improve their links with industry they must be staffed by people who understand those links. The removal of qualifications barriers and the recruitment of staff on the basis of practical and theoretical competence would be a major step forward for some systems. Few developing countries have established a cadre of workshop technicians in addition to teachers and instructors. Teachers and instructors need to be able to handle both practical and theory teaching, and the practical work is likely to include the capacity to service and repair relevant equipment, particularly where technician appointments are not feasible. Pedagogical skills are also important, with staff able to manage a wide range of classroom and workshop instructional modes. All this argues for improving both recruitment and staff development procedures. Such well-qualified staff are likely to demand salaries higher than those currently paid - and certainly more than are paid to teachers in general primary and secondary schools. The extra costs can be accommodated if accompanied by the higher productivity measures indicated above - including more teaching hours, a longer working year and larger classes. These staff can effectively be complemented by the use of part-time instructors from industry, who also allow greater flexibility of timetabling and course scheduling.

We recommend that staff development investment should include emphasis on maintenance and repair skills, and on enhanced pedagogic skills.

102. Research into technical/vocational education reinforces other recent educational research in highlighting the significance of good management and leadership for effective provision of education and training. The economies of scale gained when providing a wide range of provision within one institution are only achievable when it is well-managed. The complexities of managing large, multi-site technical and vocational institutions demand high calibre management skills, which in turn create training and development demands. Investment in improving the quality of institutional management is one of the most obvious ways of reducing the costs of technical/vocational education. Any reforms needing implementation at institutional level will only succeed with support from top management. The ability to promote curriculum change, labour and facilities productivity and employer linkages, together with the political links essential for a public sector institution, all demand sophisticated management skills. These are unlikely to be acquired unless relevant management training and other forms of development are provided. Investment in in-country management development centres as specified centres of excellence can offer a cost-effective route for the achievement of this objective.

We recommend that initial project appraisals include an analysis of local capacity for such management development, and an appropriate investment in such capacity where it is seen to be lacking.

103. A world-wide trend can be identified towards greater institutional autonomy, largely to facilitate greater responsiveness. The importance of close links with the labour market suggests that technical/vocational institutions can take advantage of that autonomy to operate in a market environment, responding without central constraints to local needs. However, in many developing countries public sector controls severely constrain the responsiveness needed in such an environment. The caution with which many governments approach institutional autonomy can be well-founded if those schools and colleges do not have the planning and management capabilities to manage their own affairs. Governmental regulations also inhibit the competitiveness which might otherwise lead to greater efficiency in systems where training providers have proliferated, particularly where the Ministries of Education and Labour have both invested in technical and vocational provision, and where schools and post-school institutions come under different Ministries. The option of 'withering on the vine' as market forces select the most effective providers is not usually acceptable. This argues for a re-evaluation of those constraints on institutional autonomy and competition. National training agencies might withdraw from the detailed regulation of individual institutions, in return for a heightened quality improvement and resource bargaining role. Institutions might welcome greater autonomy even if it incorporates the freedom to fail and close.

104. All this points powerfully to the crucial importance of sound, robust planning mechanisms at both institutional and national levels. National planning mechanisms need to draw upon labour market, economic and social objectives in order to plan for human resources which match national needs. This means that artificial barriers between the planning activities of separate ministries and national agencies need to be removed. The objectives of the education and training institutions need to reflect national priorities and needs. A natural tendency to acquire distinct institutional goals which bear little relationship to the initial national priorities the institutions were created to achieve must be resisted. This requires planning mechanisms which tune national and institutional goals, and review the institution's achievements against agreed targets. Resource bargaining within such a planned context enables institutions to prepare strategic plans within which intended achievements can be specified in terms of the necessary resource provision. The achievements can be in terms of agreed performance indicators, including student success rates (more in job than in examination success), staff and space productivity, income generation, curriculum development initiatives, and closer links with industry and business.

We recommend that ODA gives high priority to the enhancement of both institutional planning capacity and the planning framework of the national training agency within which institutions operate. Experiments with resource bargaining and incentive systems should be undertaken to encourage a more responsive relationship between training institutions and national agencies.

Summary of Recommendations

Efficiency measures

Staff productivity agreements, incentives and improvements.

Improved utilisation of space and facilities.

Equipment provision linked to spares, staff training and establishing a maintenance infrastructure.

Comparative cost analyses.

Effectiveness measures

Analysing relative impact of investment in general education.

Introducing labour market signalling by institutions.

Improving local management development and planning capacity.

Enhancing institutional autonomy.

Encouraging inter-institutional competition for resources and students.

Re-aligning the planning responsibilities of national training agencies.

Experiments with resource bargaining and incentive systems should be undertaken to encourage a more responsive relationship between training institutions and national agencies.

APPENDIX ONE:

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APPENDIX TWO

INSTITUTIONS VISITED

Thailand:

Ministry of Education:
Deputy Minister of Education and Permanent Secretary: Dr. Somchai Wudhiprecha
Inspector General: Dr. Sanan Intraprasert
Head of Teacher Civil Service Commission: Dr. Vichai Tunsiri
Director of Rajamangala Institute of Technology: Dr Tamnoon Ridtimini
Deputy Director and staff of Department of Vocational Education
Institute for the Development of Educational Administrators
Samut Prakorn College of Technology
Ry King Occupation College
Ry King Secondary School
Rajamangala Institute of Technology: Thewet and Nonthaburi campuses
Sa Kaeo Vocational Training & Development Centre (Department of Non-Formal Education)

International Labour Office:

Bureau of Programming and Management Evaluation Unit
Technical Cooperation Equipment & Subcontracting Branch
Vocational Training Branch

United States Agency for International Development:

Office for International Training, Rosslyn, Maryland

WORLD BANK, Washington DC:

Population and Human Resources Department Africa Section

Also visited (Nigeria):

Bida Federal Polytechnic
Kaura Namoda Federal Polytechnic
Kano State Polytechnic
Katsina State Polytechnic
Plateau State Polytechnic
plus discussions with Chief Executive and Head of Programmes Division of Nigerian National Board for Technical Education

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